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SLIDE ACTION VETERINARY IMPLANTER

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3 Background of the Invention
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5 Currently, growth stimulants are used to enhance the
6 body weight of animals which are raised for slaughtering,
7 such as cattle, swine, turkeys, chickens, and the like. In
8 the case of cattle and swine, approved growth hormones are
9 administered as solid pellets which are injected into the
10 ears of such animals. The ears are commonly discarded in
11 slaughtering, such that no unabsorbed residues of such
12 pellets will end up in food products intended for humans or
13 domestic animals. The pellets are formulated for timed
14 release and absorption of the active ingredients over an
15 extended period of time.

16 The pellets are normally implanted while an animal is
17 confined in a chute. An ear is grasped in one hand, and an
18 implanter device having a large hypodermic needle is used to
19 puncture the hide to enable a pellet dose to be injected
20 between the hide and the next layer of tissue in the ear.
21 The implanting must be done carefully to insure that the
22 pellets are properly placed and that no pellet remains in
23 the puncture in the hide, which could result in an
24 infection. At the same time, the procedure must be carried
25 out quickly since the animals are not entirely cooperative
26 and may shake their heads to free the held ear. Further

1 complicating the matter is that other procedures may be
2 occurring at the same time as the implanting operation while
3 the animal is confined, such as ear tagging, branding,
4 veterinary inspections or procedures, or the like, which may
5 further excite the animal.

6 The great majority of implanter devices employ manual
7 gripping force on a trigger and a hand grip of such a device
8 to propel an impeller through a pellet holding device or
9 magazine to drive the pellets through the needle and into
10 the space formed by the needle as the needle is withdrawn
11 from the ear. Most implanters have a spring arrangement
12 whereby an impeller return force is stored in the spring as
13 the impeller is driven forward by operation of the trigger
14 to return the impeller to its retracted position when the
15 trigger is released. With such an arrangement, pellet
16 implanting is complicated by the need to coordinate
17 withdrawal of the needle as the pellets exit the needle.
18 Such complexity of motion coupled with fatigue from using
19 grip strength to eject the pellets can result in mistakes,
20 such as lodging a pellet in the hide puncture or some of the
21 pellets being ejected onto the ground.

22 U. S. Patent No. 4,672,515 discloses an implanter which
23 latches the trigger in the extreme extended position of the
24 implanter and which provides a spring bias to the impeller
25 in its extended position which causes the pellets to be

1 automatically ejected as the needle is withdrawn from the
2 ear of the animal. A release lever is operated to release
3 the trigger latch after the needle is withdrawn to allow the
4 impeller to return to its retracted position. Such an
5 arrangement greatly increases the potential accuracy of
6 implanting. However, fatigue can still be a factor since
7 the grip strength of the person performing the implanting is
8 used to propel the impeller against the force of the return
9 spring arrangement.

10 A number of implanter devices use multiple pellet dose
11 magazines to hold a plurality of pellet doses. Each pellet
12 dose usually consists of a plurality of small pellets of a
13 measured drug dosage which are positioned in an in-line
14 orientation within a cylindrical chamber of the magazine.
15 The magazine is a strip having a plurality of such chambers
16 arranged in parallel relation, such as by being connected by
17 webs between the chambers. Although some implanters are
18 known to have magazines which advance to the next magazine
19 chamber each time an implant operation occurs, most
20 implanters require manual advancing of their magazines.
21 Such manual advancing of the pellet magazine requires that
22 the person performing the implanting operation remember to
23 advance the magazine after each operation. If the magazine
24 is not advanced, no pellets will be injected.

25

1 Summary of the Invention

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3 The present invention provides an improved implanter

4 apparatus which overcomes many of the problems of implanters

5 previously employed in implanting solid form drugs or

6 medicaments into animals. The implanter of the present

7 invention employs a slide action mechanism to retract an

8 impeller, store an impeller driving force in a spring in

9 cooperation with a latch mechanism, reset the trigger, and

10 advance a pellet magazine, all by a single reciprocation of

11 the slide mechanism. Pivoting the trigger into the hand

12 grip draws the impeller forward to a point at which the

13 latch mechanism releases the spring which resiliently drives

14 the impeller through the aligned magazine chamber and

15 propels the pellets into the needle. The implanter,

16 additionally, provides a spring bias to the impeller in its

17 extreme extended position which causes the pellets to be

18 automatically ejected from the needle as the needle is

19 withdrawn from the animal's ear. An implanting procedure

20 using the implanter of the present invention can be carried

21 positively and accurately with relatively little fatigue in

22 the arm muscles of the person administering the implanted

23 drugs.

24 The implanter apparatus of the present invention

25 includes housing with a tubular main housing section having

1 a grip housing section depending therefrom. An elongated
2 release shuttle with upstanding front and rear walls is
3 slidably mounted within the main housing and has a latch
4 release cam extending from the front end. An impeller
5 carrier is slidably mounted between the front and rear walls
6 of the shuttle and has an elongated impeller extending
7 forwardly therefrom through the front wall of the shuttle
8 and in alignment with a hypodermic needle mounted on and
9 extending from the front end of the main housing. An
10 impeller retractor cable or string is connected between the
11 housing and the impeller carrier and passes about the rear
12 wall of the shuttle. The latch mechanism includes a spring
13 carrier having a latch pawl at a front end and slidably
14 mounted in the main housing. An impeller drive or main
15 spring is connected between the spring carrier and the rear
16 end of the main housing. An impeller extender cable or
17 string is connected to the impeller carrier and by an
18 impeller bias spring to the spring carrier. The extender
19 cable passes about the front wall of the shuttle.

20 A tubular slide grip telescopes onto the rear end of
21 the main housing for reciprocating movement thereon and is
22 connected to an internal slide bracket which is slidably
23 mounted within the main housing. The slide bracket has an
24 upstanding bumper wall positioned forward of the front wall
25 of the shuttle and having the impeller extending

1 therethrough. A latch shoulder is formed at a position on
2 the bumper to be engaged by the latch pawl, as will be
3 described.

4 A trigger assembly is pivotally mounted within the grip
5 section of the housing and is of a hollow configuration. A
6 trigger cable is engaged between portions of the trigger
7 assembly and the shuttle. In a preferred embodiment of the
8 present invention, the trigger assembly includes a fixed
9 trigger finger plate mounted within the grip housing and a
10 movable trigger plate mounted in a trigger shell. The
11 trigger finger plates have corresponding trigger cable
12 fingers which cooperatively engage the trigger cable and
13 force it into a deepening sinuous or S-shaped pattern as the
14 trigger shell is pivoted into the grip housing. Pivoting
15 the trigger shell between an outward armed position and an
16 inward release position, thus, takes up the length of the
17 trigger cable and draws the end which is connected to the
18 shuttle toward the trigger assembly.

19 The planter of the present invention employs a pellet
20 magazine which is formed by a strip of parallel pellet
21 chambers connected by web sections between the chambers.
22 The ends of the magazine are cooperatively formed so that
23 the top end of one magazine can removably attach to the
24 bottom end of another. The magazine extends through hollow
25 portions formed in the grip housing and the trigger assembly

1 toward the top side of the implanter and out an upper
2 magazine port in the top of the main housing. The magazine
3 is automatically advanced one chamber for each reciprocation
4 of the slide grip. A magazine feed rocker is pivotally
5 mounted within the housing, has a magazine feed pawl at a
6 front end, and a cam follower at a rear end. The slide
7 bracket has a linear cam track formed therein which the cam
8 follower rides in. Reciprocation of the slide grip backward
9 then forward causes the feed pawl to respectively slip past
10 a magazine chamber then engage the chamber and advance the
11 magazine upward to align the next chamber with the needle
12 and the pawl. The implanter may also include a magazine
13 drum which is received on the lower end of the grip housing
14 and which stores a plurality of interconnected magazine
15 strips which are rolled up within the drum.

16 Pulling the slide grip back engages the slide bracket
17 bumper with the front wall of the shuttle, urging it
18 backward. The retractor cable passing about the rear wall
19 of the shuttle draws the impeller carrier backward at double
20 the rate of the shuttle. As the slide bracket is drawn
21 backward, the latch shoulder slips past the latch pawl. At
22 the end of the rearward stroke of the slide grip, the
23 shuttle is retracted fully backward along with the impeller
24 carrier, which retracts the front or distal end of the
25 impeller clear of the pellet magazine. The trigger shell is

1 pivoted outward to an armed position by rearward movement of
2 the shuttle, to which the trigger shell is connected by the
3 trigger cable. A forward stroke of the slide grip moves the
4 slide bracket forward whereby the latch shoulder engages the
5 latch pawl, thereby moving the spring carrier forward and
6 tensioning the main spring. As described above,
7 reciprocation of the slide grip also advances the pellet
8 magazine.

9 As the trigger shell is pivoted into the grip housing,
10 the trigger cable pulls the shuttle and impeller forward,
11 thereby extending the impeller end through the aligned
12 magazine chamber whereby the pellet dose or stack is urged
13 toward the needle. As the entire pellet stack enters the
14 needle, the release cam on the shuttle engages the latch
15 pawl, releasing it from the latch shoulder, and allows the
16 spring carrier to snap backward. Backward movement of the
17 spring carrier with the shuttle in a forward position is
18 transferred to the impeller carrier through the impeller
19 extender cable and bias spring, resiliently urging the
20 impeller toward its fully extended position and engaging the
21 impeller bias spring. The bias spring, to some extent,
22 cushions the force of the impeller on the pellet stack, once
23 the spring carrier is released from its latched position.
24 The main function of the bias spring is to apply a resilient
25 force to the impeller to cause positive ejection of the

1 pellet stack as the needle is withdrawn from ear of the
2 animal receiving the implant.

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4 Objects and Advantages of the Invention

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6 The principal objects of the present invention are: to
7 provide an improved device for implanting solid forms of
8 drugs, particularly into animals; to provide such a device
9 of the type including a large hypodermic needle which is
10 used to puncture the skin or hide of an animal and through
11 which a dose of pellets is moved by an elongated impeller
12 member; to provide such a device which enhances the accuracy
13 and efficiency of an implanting operation and which reduces
14 arm and hand fatigue in the person performing the implanting
15 operation; to provide such a device in which the impeller is
16 retracted and a trigger is armed by reciprocation of a slide
17 member; to provide such a device in which pivoting the
18 trigger toward a release position causes the impeller to be
19 urged forward, eventually releasing a spring which drives a
20 stack of pellets from a magazine chamber and through the
21 needle; to provide such a device which provides an outward
22 spring bias to the impeller to cause to pellets to be
23 automatically ejected from the needle as the needle is
24 withdrawn from the skin or hide of the animal receiving the
25 implant; to provide such a device which employs an

1 arrangement of cables to transfer operational movements
2 within the implanter device, including retraction of the
3 impeller in response to backward movement of the slide
4 member and extension of the impeller in response to pivoting
5 the trigger; to provide such a device including a pellet
6 magazine including an elongated strip of parallel oriented
7 pellet chambers which extends through a grip portion of the
8 implanter housing; to provide such a device which
9 automatically advances the magazine to align a new pellet
10 chamber with the needle and impeller in response to
11 reciprocation of the slide member; and to provide such a
12 slide action veterinary implanter device which is economical
13 to manufacture, which is positive and efficient in
14 operation, and which is particularly well adapted for its
15 intended purpose.

16 Other objects and advantages of this invention will
17 become apparent from the following description taken in
18 conjunction with the accompanying drawings wherein are set
19 forth, by way of illustration and example, certain
20 embodiments of this invention.

21 The drawings constitute a part of this specification
22 and include exemplary embodiments of the present invention
23 and illustrate various objects and features thereof.

24

25

1 Brief Description of the Drawings

2
3 Fig. 1 is a perspective view of a slide action
4 veterinary implanter apparatus which embodies the present
5 invention.

6 Fig. 2 is a right side elevational view of the
7 implanter apparatus of the present invention.

8 Fig. 3 is a left side elevational view of the implanter
9 apparatus with a slide member shown in a fully extended
10 position.

11 Fig. 4 is a greatly enlarged transverse sectional view
12 taken on line 4-4 of Fig. 3 and illustrates details of a
13 magazine feed mechanism of the implanter apparatus.

14 Fig. 5 is a longitudinal sectional view of the
15 implanter apparatus illustrating components of the apparatus
16 in an "armed" state and ready for an implanting operation.

17 Fig. 6 is a somewhat enlarged fragmentary view similar
18 to Fig. 5 and illustrates details of a pellet magazine strip
19 and a magazine feed pawl.

20 Fig. 7 is an enlarged fragmentary longitudinal
21 sectional view taken in plan on line 7-7 of Fig. 5 and
22 illustrates details of internal components of the implanter
23 apparatus in a nearly armed state.

24 Fig. 8 is a fragmentary view similar to Fig. 7 and
25 illustrates details of a latch pawl of a spring carrier

1 member and a latch shoulder of an internal slide bracket of
2 the slide mechanism of the implanter apparatus.

3 Fig. 9 is a fragmentary transverse sectional view taken
4 on line 9-9 of Fig. 7 and illustrates internal details just
5 forward of an impeller carrier of the implanter apparatus.

6 Fig. 10 is a fragmentary transverse sectional view
7 taken on line 10-10 and illustrates internal details just
8 forward of a front wall of a release shuttle of the
9 implanter apparatus.

10 Fig. 11 is a side elevational view of a spring carrier
11 member of the implanter apparatus.

12 Fig. 12 is a fragmentary transverse sectional view
13 taken on line 12-12 and illustrates internal details forward
14 of a bumper wall of the internal slide bracket of the slide
15 mechanism of the implanter apparatus.

16 Fig. 13 is a longitudinal sectional view of the
17 implanter apparatus illustrating components of the apparatus
18 in a released state after completion of an implanting
19 operation.

20 Fig. 14 is an enlarged fragmentary view detailed view
21 similar to Fig. 13 and illustrates spatial relationships of
22 the impeller member, a pellet magazine chamber, and the
23 hypodermic needle of the implanter apparatus.

24 Fig. 15 is a perspective view of the implanter
25 apparatus illustrating a magazine drum for storing a

1 plurality of pellet magazine strips connected in end to end
2 relation.

3 Fig. 16 is a greatly enlarged front elevational view of
4 a pellet magazine for use with the implanter apparatus,
5 taken on line 16-16, and illustrates the manner of
6 connecting multiple magazine strips in end to end
7 relationship.

8 Fig. 17 is an enlarged transverse sectional view of the
9 grip section of the housing of the implanter apparatus and
10 illustrates details thereof along with details of a trigger
11 assembly of the apparatus.

12

13 Detailed Description of the Invention

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15 As required, detailed embodiments of the present
16 invention are disclosed herein; however, it is to be
17 understood that the disclosed embodiments are merely
18 exemplary of the invention, which may be embodied in various
19 forms. Therefore, specific structural and functional
20 details disclosed herein are not to be interpreted as
21 limiting, but merely as a basis for the claims and as a
22 representative basis for teaching one skilled in the art to
23 variously employ the present invention in virtually any
24 appropriately detailed structure.

25 Referring to the drawings in more detail:

1 The reference numeral 1 generally designates a slide
2 action veterinary implanter apparatus which embodies the
3 present invention. The apparatus 1 is used to implant solid
4 form drugs, such as pellets 2, Fig. 6, into an animal 3
5 through a hypodermic needle 4.

6 The implanter apparatus 1 generally includes a housing
7 7 having a grip portion 8 with a trigger assembly 9
8 pivotally mounted therein. An impeller assembly 11 (Fig.
9 5), including an impeller member 12, is slidably mounted
10 within the housing 7 in alignment with the needle 4 and a
11 chamber 14 of a pellet magazine 15. A slide mechanism 17,
12 including an external slide member 18, is mounted on the
13 housing 7 and is internally engaged with the impeller
14 assembly 11, the trigger assembly 9, and the pellet magazine
15 15 to retract the impeller assembly 11 within the housing 7,
16 pivot the trigger assembly 9 to an extended and armed
17 position, store an impeller extension force in an impeller
18 extender spring 19 (Fig. 7), and advance the pellet magazine
19 15 by reciprocation of the slide member 18. The needle 4 is
20 used to puncture through the skin or hide of a part of the
21 animal 3, such as an ear 20, and the trigger assembly 9 is
22 pivoted into the grip portion 8 of the housing, causing
23 impeller member 12 to be urged by the extender spring 19
24 through the magazine chamber 14, thereby forcing a stack of
25 pellets 2 through the needle 4. An impeller bias spring 22

1 is engaged with the impeller 12 in such a manner that the
2 impeller 12 ejects the pellets 2 from the needle 4 as the
3 needle 4 is withdrawn from the ear 20 of the animal 3.

4 Referring to Figs. 4 and 5, the housing 7 includes the
5 grip portion or grip housing 8, a tubular slide housing
6 portion 25, and a rocker housing portion 26. The grip
7 housing 8 extends at approximately a right angle to the
8 slide housing 25. At a front end of the housing 7, a
9 threaded nut 29 secures the needle 4 to the housing 7 by way
10 of a threaded extension 29 of the housing 7 which has
11 complementary threads. The slide member or slide grip 18 is
12 tubular and is telescoped over a rear end 31 of the slide
13 housing portion 25 and is slidable thereon. Parallel guide
14 tracks 33 are formed on internal surfaces of the slide
15 housing 25 in transversely spaced relation near an upper
16 side of the slide housing 25. The tracks 33 (Figs. 7, 9,
17 10, and 12) extend along a substantial portion of the length
18 of the slide housing 25. The housing 7, the trigger
19 assembly 9, and the majority of the components of the
20 implanter 1 are formed of plastics, as by molding. The
21 housing 7 is formed in lateral halves which are joined, as
22 by fasteners 35, such as screws (Fig. 2).

23 Referring particularly to Figs. 7-12, the slide
24 mechanism 17 includes an internal slide bracket 38 including
25 an elongated connector link 39, a bumper wall 40 upstanding

1 from the connector link 39, and a magazine grip 41 extending
2 forwardly from the bumper wall 40. A latch shoulder 42 is
3 formed on a front edge of the bumper wall 40. The slide
4 bracket 38 is slidably mounted in the tracks 33 within the
5 slide housing 25 and rides on a pair of ledges 43 extending
6 inwardly from the sides of the slide housing 25 (Fig. 10).
7 A rear end of the connector link 38 is connected to the
8 slide grip 18 so that the slide bracket 38 is moved whenever
9 the slide grip 18 is moved. The connector link 39 has a
10 linear cam track 44 formed therein (Fig. 3).

11 An elongated release shuttle 45 is slidably mounted in
12 the tracks 33 rearward of the bumper wall 40. The shuttle
13 45 includes a floor member 46 with a front shuttle wall 47
14 and a rear shuttle wall 48 upstanding from opposite ends
15 thereof. The front wall 47 has a latch release cam 49
16 extending forwardly therefrom. The impeller assembly 11
17 includes an impeller carrier 52 which is slidably mounted in
18 the tracks 33 and is positioned between the front and rear
19 walls 47 and 48 of the release shuttle 45. The impeller
20 member 12 has a rear or proximal end 53 mounted in the
21 impeller carrier 52. The impeller member 12 extends through
22 the front wall 47 of the shuttle 45 and through the bumper
23 wall 40 of the slide bracket 38 and terminates at a front or
24 distal end 54. the impeller member 12 and the needle 4 are
25 preferably formed of stainless steel.

1 A spring carrier 57 is slidably mounted between the
2 lower side of the track 33 on one side of the slide housing
3 25 and a ledge 43 therebelow (Fig. 10). A front end 59
4 (Fig. 11) of the spring carrier 57 has a latch pawl 58
5 formed thereon which is adapted and positioned to engage the
6 latch shoulder 42 of the slide bracket 38. The impeller
7 extender spring 19 has one end connected to an intermediate
8 position of the spring carrier 57 and an opposite end
9 connected to an extender spring anchor 60 which is
10 positioned at the rear end 31 of the slide housing 25. The
11 impeller bias spring 22 has a rear end connected to a rear
12 end 61 of the spring carrier 57 and a front end connected to
13 an impeller extender cable 64.

14 The opposite end of the extender cable 64 is connected
15 to the impeller carrier 52 and passes about the front wall
16 47 of the shuttle 45. An impeller retractor cable 66 has
17 one end connected to the slide housing 25 at 67 (Fig. 7),
18 has the opposite end connected to the impeller carrier 52,
19 and passes about the rear wall 48 of the shuttle 45. The
20 cables 64 and 66 may, in fact, be a single cable with knots
21 separating extender and retractor sections. The term
22 "cable" is used to describe the members 64 and 66; however,
23 they are preferably very flexible and may be formed as a
24 type of string, twine, or the like from a material such as
25 nylon or the like.

1 Referring particularly to Figs. 5, 13, and 17, the
2 trigger assembly 9 includes an external trigger shell 70 and
3 a movable trigger finger plate 72 having a plurality of
4 movable trigger fingers 73 formed thereon. A fixed trigger
5 finger plate 75 is positioned within the grip housing 8 and
6 has a plurality of fixed trigger fingers 76 formed thereon.
7 The trigger shell 70 and movable plate 72 are pivotally
8 mounted on a trigger pivot bearing 78 formed within the
9 housing 7.

10 The fingers 73 and 76 are positioned for intermeshing
11 engagement about a trigger cable 80 upon pivoting the
12 trigger assembly 9 into the grip housing. Figs. 5 and 13
13 are somewhat diagrammatic in that the movable fingers 73 are
14 shown disembodied from the movable plate 72, to illustrate
15 their cooperation with the fixed fingers 76. The trigger
16 cable 80 has a fixed end 81 anchored at a lower end of the
17 fixed finger plate 75 and an opposite free end 82 connected
18 to the front wall 47 of the shuttle 45 and passes about the
19 fingers 73 and 76 in a serpentine path 84 which deepens with
20 the degree of meshing of the fingers 73 and 76 as the
21 trigger assembly 9 is pivoted into the grip housing 7.

22 The trigger cable 80 is preferably fairly flexible and
23 strong and engages the fingers 73 and 76 with a low degree
24 of friction and may have a form similar to a flat wound type
25 of "silk and steel" type of guitar string. Some of the

1 fingers 73 and 76 are provided with retainer tabs 86 to
2 retain the trigger cable 80 threaded about the fingers 73
3 and 76 and to aid in assembly of the implanter apparatus 1.
4 The arrangement of finger plates 72 and 75 and the fingers
5 73 and 76 enables a relatively large displacement of the
6 free end 82 of the trigger cable 80 for a relatively small
7 pivot angle of the trigger assembly 9. A large pulley would
8 otherwise be required to achieve a comparable displacement
9 of the free end 82 for the same angle of pivot of the
10 trigger assembly 9.

11 The grip housing 8 and the trigger assembly 9 are
12 configured in such a manner as to provide a magazine channel
13 88 through which the pellet magazine 15 extends (Fig. 17).
14 The magazine 15 is indexed upwardly by reciprocation of the
15 slide grip 18. A magazine feed rocker arm 90 is pivotally
16 mounted within the rocker portion 26 of the housing 7 and
17 has a cam follower peg 91 (Fig. 4) at a rear end and a
18 magazine feed pawl 92 at a front end. The cam follower 91
19 rides in the linear cam track 44 formed in the connector
20 link 39 of the slide bracket 38. The cam track 44 has a
21 straight section 94 parallel to a longitudinal axis of the
22 slide housing 25 at the rear of the connector link 39 and an
23 angled section 95 which angles upward toward the front.
24 Movement of the angled section 95 past the cam follower 91,
25 upon rearward extension of the slide grip 18, raises the cam

1 follower 81 and lowers the pawl 92, which slips past a
2 magazine chamber 14. Return movement of the slide grip 18
3 toward the front end 28 of the housing 7 lowers the cam
4 follower 91 and raises the pawl 92, which engages a magazine
5 chamber 14 and raises the magazine 15. The connector link
6 39 preferably has a snap member 96 which engages an edge of
7 the housing 7 when the slide grip 18 is returned to its
8 forward position to retain the slide grip 18 and the slide
9 bracket 38 in the retracted position of the slide grip 18.

10 Referring to Figs. 15 and 16, the illustrated magazine
11 strip 15 of the implanter apparatus 1 has a capacity of
12 twenty pellet doses stored in corresponding pellet chambers
13 14 which are connected by intervening webs 97. The chambers
14 14 are slightly conical shape and are arranged in a side by
15 side parallel relation. The chambers 14 may have internal
16 formations (not shown) to retain the pellets 2 therein. A
17 plurality of strips 15 can be connected in end to end
18 relation to increase the implanting capacity before the
19 implanter 1 requires reloading. Each strip 15 has a
20 connector clamp 98 at a top end and a cooperating connector
21 bead 99 formed at a lower end on a terminating web 97. The
22 top side of the connector clamp 98 is split to receive the
23 lower web 97 and bead of another strip 15. The implanter
24 apparatus may include a magazine drum 100 which is snapped
25 onto a lower end of the grip housing 8. A plurality of end

1 to end connected strips are rolled up into the drum 100 and
2 are fed upwardly through the grip housing 8 therefrom. As
3 the pellets 2 in an individual magazine strip 15 are
4 exhausted, the empty strip 15 can be detached from the
5 remaining strip 15 in the apparatus 1 and discarded. Each
6 magazine strip 15 may be provided with a key tab 101 which
7 matches with a corresponding key notch (not shown) in a
8 magazine entry port (not shown) at the lower end of the grip
9 housing 8 and a similar key notch (not shown) in a magazine
10 exit port 102 at the top of the housing 7, to properly
11 orient the magazine 15.

12 The planter apparatus 1 is prepared for an implanting
13 operation by extending the slide grip 18 rearwardly, loading
14 a pellet magazine strip 15 into the grip housing 8, and
15 indexing the first pellet chamber 14 into alignment with the
16 needle 4 and impeller 12. The slide grip 18 must be
17 extended rearwardly to clear the impeller member 12 and the
18 magazine grip 41 from the path of the incoming magazine 15.
19 Rearward movement of the slide grip 18 additionally engages
20 the bumper wall 40 of the slide bracket 38 with the front
21 wall 47 of the release shuttle 45 and urges it rearwardly.
22 Rearward movement of the shuttle 45 retracts the impeller
23 assembly 11 by way of the impeller retractor cable 66
24 passing about the rear wall 48 of the shuttle 45 and
25 connecting to the slide housing 25. The arrangement of the

1 retractor cable 66 causes the impeller assembly 11 to
2 retract at twice the retraction rate of the shuttle 45
3 whereby the impeller carrier 52 begins the rearward stroke
4 of the slide grip 18 just behind the front wall 47 of the
5 shuttle 45 and ends up just in front of the rear wall 48 at
6 the extreme rear point of the rearward stroke. Rearward
7 movement of the shuttle 45 draws the free end 82 of the
8 trigger cable 80 rearwardly whereby tension in the trigger
9 cable 80 unmeshes the movable fingers 73 from the fixed
10 fingers 76, causing the trigger assembly 9 to be pivoted
11 outwardly to an armed position (Fig. 5). The rearward
12 stroke of the slide grip 18 additionally lowers the magazine
13 feed pawl 92.

14 The forward or return stroke of the slide grip 18
15 pushes the slide bracket 38 forward whereby the latch
16 shoulder 42 engages and latches the latch pawl 58 of the
17 spring carrier 57 and carries it forward, thereby tensioning
18 the impeller extender spring 19. As the forward stroke
19 continues, the magazine feed pawl 92 is raised, thereby
20 indexing the magazine 15 upward to align a pellet chamber 14
21 between the needle 4 and the impeller member 12. At the
22 forward end of the forward stroke, the snap member 96 of the
23 connector link 39 snaps into the rocker housing 26. The
24 implanter apparatus 1 is, thus, prepared for implanting a
25 pellet dose 2 into the ear 20 of an animal 3. The ear 20 of

1 the animal 3 is grasped, and the needle 4 is punctured
2 through and underneath the hide of the ear 20, while
3 attempting to avoid any large blood vessels.

4 The slide bracket 38 and spring carrier 57 form a latch
5 mechanism 103 which retains an extension spring force in the
6 extender spring 19. Release of the latch mechanism 103 by
7 pivoting the trigger assembly 9 into the grip housing 8
8 toward a release position is a two stage process. As the
9 trigger assembly 9 is pivoted into the grip housing 8, the
10 shuttle 45 is drawn forward by tension in the trigger cable
11 80 thereby engaging the rear wall 48 of the shuttle 45 with
12 the impeller carrier 52. The tip 54 of the impeller member
13 12 is pushed forward through the aligned pellet chamber 14
14 which urges the stack of pellets 2 just into the needle 4.

15 As inward pivoting of the trigger assembly 9 continues,
16 the latch release cam 49 on the release shuttle 45 engages
17 the latch pawl 58 and releases it from the latch shoulder
18 42. The spring carrier 57 snaps rearwardly under the
19 resilient tension of the impeller extender spring 19,
20 thereby driving the impeller member 12 forward through the
21 impeller extender cable 64 and the impeller bias spring 22.
22 The bias spring 22, to some extent, softens the shock of the
23 extender spring 19 on the impeller assembly 11 and
24 simultaneously applies a forward resilient bias on the
25 impeller member 12, urging to a position extending entirely

1 through the needle 4. As the needle 4 is withdrawn from the
2 ear 20, the impeller member 12 completely ejects the pellets
3 2 from the needle 4 as the tip 54 of the impeller 12 emerges
4 from the end of the needle 4, whereby the pellets 2 are left
5 within the ear 20 of the animal 3.

6 In actual operation, the trigger release procedure can
7 be carried out very quickly after inserting the needle 4
8 into the animal's ear 20. The spring force of the extender
9 spring 19 does most of the work of driving the pellets 2
10 through the needle 4, whereby fatigue is reduced and whereby
11 the operator can more easily concentrate on controlling the
12 animal 3 and proper placement of the needle 4.

13 It is to be understood that while certain forms of the
14 present invention have been illustrated and described
15 herein, it is not to be limited to the specific forms or
16 arrangement of parts described and shown.

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